



# MARSHALL STAR

Serving the Marshall Space Flight Center Community

July 15, 2004

## Marshall's Saturn-era labs made moon landing happen

By Mike Wright and Jonathan Baggs

**W**ernher von Braun, the first director of the Marshall Space Flight Center, focused more on developing space hardware than on issuing policy statements. But he had one management policy that he championed more than any other: "Keep your hands dirty." Von Braun called it "MSFC Management Policy No.1."

The famous rocket scientist had nothing against a lab chief or engineer or technician washing their hands, but advocated a hands-on approach to science and engineering and building rockets.

Von Braun and his civil service and industry team built the Saturn V rocket that lifted man on his journey to the surface of the moon 35 years ago this month. Today there are still those who remember their personal contributions to the mammoth rocket that stood 365 feet



Saturn V Apollo II lifts off on July 16, 1969.

tall and lifted itself on the strength of five F-1 engines, each generating 1.5 million pounds of thrust. The credit for the success belongs to many, including those who pushed the paper, counted the dollars, bought the equipment, swept the floors and performed numerous other necessary tasks.

Program and project offices at Marshall directed the program. But another group at Marshall and in similar industry locations across the country held a special vantage point. These were the workers in Marshall Center laboratories where hardware was designed, built, tested and re-tested.

The organizational structure and sometimes even the names of the laboratories would later change. However, a 1967 document located in Marshall's history archives tells a lot about Marshall's labs in the years just before Apollo 11. The

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Photo by Doug Stoffer, NASA/Marshall Center

Anthony McCoy of ERC, Inc., left, discusses with Natalie Cowans, an I Am Set summer intern, some of the programs being developed at the Marshall Center.

## I Am Set program offers growth for students, mentors

By Patricia Dedrick Lloyd

Natalie Cowans of Huntsville performed her work assignments for a Marshall Center contractor so well, she is expected to have her I Am Set Summer Internship Program position extended another month. That will mean extra money for college this fall.

For Daxesh Modi, a native of India and a senior at the Alabama School for the Deaf, this summer meant a time to build his confidence in learning English and making friends.

The I Am Set Summer Internship Program offered unique

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# Apollo II

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Technical Facilities & Equipment Digest portrays “the capability of technical facilities and equipment” at Marshall. It surveys each of the eight laboratories then in existence at the Center. Add to this data, recollections from those who worked in the labs.

This is a glimpse of how some labs might have looked. One might see sheet metal, tubing, schematics, welding, brazing, fork lifts, cranes, mammoth facilities, machinery, cables, overhead cranes, test equipment, vacuum tubes, drawings as big as a ping pong table, electrical components, clean rooms, fittings, turbopumps, chambers, concrete, steel, consoles and tooling. And then add one more element, the workers, too numerous in function, skill or talent to categorize.

In the mid-1960s, the Marshall Center employed nearly 7,500 civil servants, not counting the thousands of on-site and off-site contractors. Von Braun, absolutely void of any ivory tower thinking, followed his own “dirty hands” dictate and showed up in the labs at any time of day, sometimes driven by nothing more than his own unrelenting curiosity to understand even the smallest detail. One veteran Marshall manager remembers working the swing shift in one of the labs one sweltering summer night and turning around to see von Braun, dressed in Bermuda shorts, a 10-gallon hat and cowboy boots.

Described first in the Technical Facilities & Equipment Digest was the Marshall Aero-Astroynamics Lab. “The facilities of the Aero-Astroynamics Laboratory, with the exception of some meteorological equipment, are devoted to fluid mechanics... Obtainable flow conditions range from free molecule to continuum flow.” Marshall’s Ann McNair served as chief of the lab’s Mission Studies Section. Her work included Saturn flight trajectories and determining how long satellites might remain in orbit.

Marshall retiree Bill Snoddy was a member of Marshall’s Research Projects

Laboratory during the Apollo era. The digest points to the lab’s capability for applied research in the fields of physics and astrophysics, space environment and others. Snoddy was part of a group that worked on the thermal characteristics of the Moon. The group studied the characteristics using telescopes set up at Marshall, Snoddy said. “We wanted to know more about the (lunar) environment and how the astronauts could be protected against that thermal environment.”

Dave McGlathery said he will always remember the third Sunday in July – July 20, 1969 – “just like it was yesterday.” McGlathery worked in the lab’s Nuclear and Ion Physics Branch during the Apollo



era. He assisted senior scientists in performing probabilistic radiation shielding and dosage calculations.

The digest also pointed out that “during 1967 the Computation Laboratory will acquire analog, hybrid and high speed digital computers, providing MSFC with the computation potential necessary in research and development of space vehicles and in efficient administrative management of the center.” Computer historian James E. Tomayko has studied the work of the first person to direct Marshall’s Computation Laboratory. He does so in an article entitled “Helmut Hoelzer’s Fully Analog Computer.” Tomayko refers to a fully “electronic general purpose analog computer” that Hoelzer built as a member of von Braun’s German rocket team during World War II.

“This computer is significant in the history, not only of analog computation but also of the formulation of simulation techniques.” Hoelzer’s foundational work and the work done in Marshall’s Computation Lab “contributed to a system for rocket development that resulted in vehicles capable of reaching the moon.”

Marshall’s Richard Beckham and retiree E.C. Smith were employed in Marshall’s Astrionics Lab during the Apollo era. According to the digest, that lab provided “a broad capability for developing and evaluating components and systems involved in aerospace communications, guidance and control, air-borne and ground instrumentation,

vehicle and ground power, and electrical integration systems.”

Beckham recalls his involvement in developing software for the Apollo program. Guidance and navigation were key parts of the lab’s operations, Beckham said. “It amazed me how our mathematicians could come up with the data logic on how to get to the moon.” Smith performed laboratory simulation studies of the Saturn IB and Saturn V vehicle control system and wrote the control system information document for the Saturn V.

Marshall’s Propulsion and Vehicle Laboratory focused on structures, mechanics, propulsion and materials as applied to launch and space vehicles and their payloads. Marshall’s Ann Whitaker, director of the Science Directorate, worked as a physicist in the lab. Her work during the Saturn era included studying lubricants and conducting research in surface physics. Part of her research included a series of high-load friction tests of metal surfaces coated with a dry film lubricant.

Marshall’s Manufacturing Engineering Lab had large fabrication and assembly high bay areas and associated cranes, large access doors, machine shops, clean rooms and specialized equipment necessary for producing and refurbishing prototypes of large aerospace hardware systems. It

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# Apollo II

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included equipment for research and development in advanced manufacturing techniques, methods and tooling for structural, surface finish, and pressure vessel applications. A major part of the work in this lab focused on developing a new alloy for use in the Saturn V, recalls retiree Bob Schwingamer. He also pays tribute to the work done in the lab by Margaret "Hap" Brennecke. Hap, as she preferred to be called, was perhaps the first female welding engineer hired at Marshall. She determined the fabric of new alloys. She also tackled the challenges associated with welding the huge Saturn stages. "Welding a 33-foot circumference structure in one continuous weld was tricky," Brennecke recalled.

"Complete and thorough testing can be conducted for leakage, resistance, polarity, resolution, impedance and voltage drop," the digest said regarding the work done in Marshall's Quality, Reliability and Assurance lab. Quality and reliability in the Saturn program were engrained in the fabric of the German-born lab directors and their U.S.-born engineering teams at Marshall. "If we had a valve that had to function ten times on a Saturn mission, we probably cycled it 50,000 times before hand," one Marshall machinist recalled. To some at NASA Headquarters, that kind of attitude regarding testing threatened meeting President Kennedy's 1961 call to land a human on the Moon before the end of the decade. For example, headquarters had difficulty convincing Marshall that plans for a previously unmanned Apollo 8 mission should include an astronaut crew. Marshall engineers finally agreed to the mission. But there would be no launch until engineers in Dieter Grau's laboratory went over the vehicle once again. Sure enough, numerous little mistakes and potential problems were uncovered, said Saturn historian Roger Bilstein. "We went through the vehicle from top to bottom. I think that was kind of a lifesaver," Grau later said regarding the ultimately



**Lee B. James, left, manager of the Saturn Program at the Marshall Center, talks with Isom Pigell in the firing room at the Kennedy Space Center during the countdown demonstration test for the Apollo II mission.**

successful mission.

Perhaps no laboratory at Marshall could attract more interest in its work than the famous Marshall Test Lab. Some called it the land of smoke and thunder. A geographic complex in its own right, the Test Lab was divided into two major areas — east and west. The 1967 digest lists some of its components: its static-firing test stands, single-engine stands, ground support equipment test and checkout facilities, full-scale dynamic test stands, blockhouse control and measuring centers, model engine and component test stands and cells, industrial water reservoirs and pumping facilities, instrument development shop, test support shop, high pressure gas generating plants, high pressure gas storage and distribution systems, cryogenic and propellant storage and distribution systems and large stage land transporters. "The work was intensive," recalled Marshall retiree Bill Simmons who designed test fixtures for the lab. "Nobody had ever done this kind of work before," he added. Charlie Gillespie, another retired Marshall test lab engineer, recalled the challenges that still "bring back a lot of very good memories." It was in the

West Test Area that Marshall test fired all five F-1 engines at once. The tests led one writer to describe Marshall as the "Land of the Earth Shakers." In the East Test Area, Marshall engineers vertically suspended a complete Saturn V in the lab's huge Dynamic Test Stand where it was subjected to a series of vibration tests to verify the complete dynamic integrity of the vehicle.

A complete survey of Marshall's scientific and engineering laboratories would encompass hundreds of pages. No survey could ever reveal the thousands of achievements that the men and women in Marshall's laboratories and elsewhere made to the success that America enjoyed when humans landed on the moon on July 20, 1969.

Marshall retiree E.B. May summed up the Saturn role at the center this way: "It was just a very exciting time. We went to work early and sometimes finished after dark." In short, May and others at Marshall and elsewhere kept their hands dirty.



**A view of an astronaut's footprint in the lunar soil after reaching the Moon on July 20, 1969.**

# Program

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opportunities for personal and professional growth to each of its 25 participants, said program director, Dr. Barbara Cady.

I Am Set, the acronym for Individuals with Abilities in Math, Science, Engineering and Technology, is funded primarily by NASA and its industry partners and managed by Alabama A&M University. It is designed for high school students headed to college or college students who have an interest in high technology fields. Students must also be physically, emotionally or medically disabled to qualify.

The program officially concludes Thursday with an awards luncheon for participants, their families and mentors at Alabama A&M. Awards will be given for student and mentor of the year. Andrew Parker, a returning intern, won the Student of the Year Award last summer.

Cady, also an Alabama A&M professor, said she is still finding jobs for students. The program was so popular this year, she said, it attracted more students than it could accommodate. She took them anyway and continued trying to find work for them — some of it unpaid.

“The exposure is what this is all about,” Cady said. “The money is only part of it. Students take these jobs in a heartbeat because of the exposure to the work environment.”

Students work about 30 hours per week.

Cady said the program’s goals are aggressive. It’s designed to motivate students who have high-tech interests, to encourage them to become independent and productive individuals and help professionals in these high-tech areas to better understand how to use assistive technology and accommodate the needs of the disabled.

She continues to seek mentors and employment for students still waiting for a paid position. It costs about \$1,400 to provide a paid six-week slot for a student.

Cowans, a sophomore at the University of North Alabama in Florence, said the work experience and meeting people has helped her excel in college. “It teaches you how to work with other

people. And at NASA you get involved with lots of other things —outside of your work assignments,” Cowans said. “It also helped me with time management.”

Anthony “Mack” McCoy, Cowans’ mentor and a senior engineer with ERC Inc. in the Flight Software Group, said when he was asked to become a mentor he thought he wouldn’t have time. Now he’s glad he took part in it.

He said Cowans performed so well, another company is extending her internship a month. “This student came in and did an excellent job. She surpassed my expectations. She performed assignments with efficiency and with very little direction,” McCoy said.

Cowans, working with the Capability Maturity Model Integrated Program, was responsible for tracking data and placing software information in notebooks. She pulled the artifacts off the computer, sorted them and categorized them.

Mentoring Daxesh Modi brought unique challenges for Terri Scribbs of the Office of the Chief Information Officer. Modi was learning English while also learning to research computer vulnerabilities.

Scribbs said she knew enough American Sign Language that she and Modi could communicate, but at times they resorted to writing notes to one another.

“Dax is deaf and learning English. He has made great effort to use speech when communicating with the hearing people around him. Each day his vocal vocabulary increased and became more and more clear,” she said.

As important, she said, is how both their confidences grew because of this experience. She is now more comfortable with her sign language abilities and Modi communicates better in English and makes friends more easily.

Noting those successes, Cady wants to expand the program to run year ‘round, allowing mentors to meet weekly with their students. “This is important for these young people and we can make it happen,” she said.

## Job Announcements

**MS04C0159**, Education Program Specialist, GS-1720-14, Customer and Employee Relations Department. Closes July 15. Contact: Edwina Bressette, 544-8115.

**MS04C0153**, Supervisory, AST, Reliability & Quality Assurance, GS-0861-15, Safety and Mission Assurance Directorate, Shuttle Assurance Department. Closes: July 19. Contact: Rita Evans-McCoy, 544-7507.

**MS04D0168** (outside hire), Lead Program Manager, GS-0340-15, Office of Chief Financial Officer, IFMP Admin-

istrative Systems. Closes: July 19. Contact: Dana Blaine, 544-7514.

**MS04C0161**, AST, Aerospace Flight Systems, GS-0861-15, Space Shuttle Propulsion Office, Space Shuttle Main Engine Project. Closes: July 20. Contact: Edwina Bressette, 544-8115.

**MS04C0162**, AST, Lead Aerospace Engineer, GS-0861-15, Space Shuttle Propulsion Office, External Tank Project Office. Closes: July 20. Contact: Edwina Bressette, 544-8115.

**MS04B0163** (outside hire), Equal Employment Manager, GS-0260-15,

Equal Employment Office. Closes: July 20. Contact: Edwina Bressette, 544-8115.

**MS04N0160**, AST, Aerospace Flight Systems, GS-0861-14, Space Shuttle Propulsion Office, Solid Rocket Booster Project. Closes: July 21. Contact: Edwina Bressette, 544-8115.

**MS04D0167** (outside hire), AST, Mission Operations Integration, GS-0801-14, Flight Projects Directorate, Payload Operations and Integration Department. Closes: July 16. Contact: Carolyn Lundy, 544-4049.

# Announcements

## Leaders named for the Marshall alignment teams

Co-leads have been named for the Configuration Teams responsible for defining information critical to implementing the Marshall Center's strategic alignment efforts. Complete team rosters are available on 'Inside Marshall.'

## Central Reproduction adds an after-hours drop box

Central Reproduction has added an after-hours drop box on the door of Room G34, Bldg. 4200. Customers may leave hard copies, CDs, zip disks and memory sticks of the material needed. If a service request has been opened, leave that number with the media. If no service request has been opened, leave the name of the person requesting the material, reproduction requirements and completion date with the media. For after-hours service, call Bruce Weaver at 586-4719.

## E-Payroll transition meetings scheduled for July 28

Meetings to review the e-Payroll transition with Marshall Center managers and administrative personnel will be held at 10 a.m. and 1 p.m. on July 28 in the Morris Auditorium. All NASA centers will adopt a new payroll system starting Aug. 8.

For more information, call Beverly Fruehauf at 544-1704 or go to <http://epayroll.nasa.gov/info.html>

## Redstone Arsenal hunting and fishing town hall meeting set

Redstone Arsenal's Hunting and Fishing Council is holding a town hall meeting at 6 p.m., July 22, at the Campbell Recreation Center. The open forum is for those who hunt and fish on the Arsenal to learn about any regulation changes and to ask questions. E-mail Bill Moreland at [bill.moreland@redstone.army.mil](mailto:bill.moreland@redstone.army.mil) for further information.

## 'Inside Marshall' has current news on Marshall alignment

Marshall team members can get current information on the Marshall Center's strategic alignment and the NASA Transformation from a new link on "Inside Marshall." Go to: <http://inside.msfc.nasa.gov/nasa-transform.html>

## Golf tournament set for July 24

The Mars Golf League is hosting an individual handicap tournament on July 24 at the Colonial Golf Course. Entry deadline is Friday. All fees are due at signup. Costs are \$26 without a cart and \$36 with a cart. This tournament and another on Aug. 28 at Goose Pond Colony will decide the league championships. For more information, call Lee D. Foster at 544-1589.

## Exploration Systems Directorate Web site is active

Visitors to the Exploration Systems Directorate's new Web site will learn more about the journey that will mark the beginning of a sustained human presence in the solar system. The site gives visitors information on the directorate's programs such as Constellation Systems, Technology Research and Development, Prometheus and Centennial Challenges. It also lists procurement announcements and has an events calendar. Go to <http://explorationsystems.nasa.gov>

## Annual ski week is Feb. 5-12 at Park City Resort

The 14th Annual NASA Ski Week will be Feb. 5-12, at Park City Resort in Utah, near Salt Lake City. Skiers and riders from seven NASA centers will gather at this Olympic-sized, triple-resort-area for camaraderie and winter sports. All Marshall team members, retirees, spouses, and dependents are eligible to participate. For information, call Tom Dollman at 233-0705 or e-mail him at [tom.dollman@nasa.gov](mailto:tom.dollman@nasa.gov). Use "NASA ski week" in the subject line.

## Marshall Center Leadership symposium set for Aug. 24

The Marshall Center will host a day-long leadership symposium at the Von Braun Center in Huntsville on August 24. The event will focus on developing strong leaders who have the knowledge and skills to impact the present and future.

The symposium, entitled "Learning in a Time of Change," is presented by the Marshall Center, its partners and the local community. It will bring together leadership experts including former U.S. Rep. J. C. Watts, R-Okla., and Dr. John C. Maxwell. Others from industry, government and the community who have a unique blend of backgrounds and experiences will join them. Go to <http://mi.msfc.nasa.gov/Leadership/index.html> for more information on the conference and how to register.

## U.S. Rep. Cramer to hold update in Huntsville on July 29

Marshall team members are invited to attend a Washington Update with U.S. Rep. Bud Cramer at noon on July 29 at the Von Braun Center in Huntsville. Tickets are \$27. Make reservations and payments to Rosa Kilpatrick at 544-0042.

## Center Operations redesigns Web site; products easier to get

Center Operations Directorate has redesigned its Web site to make it easier for customers to obtain products and services from the directorate. A single portal now provides easy access for placing an order, obtaining additional information about a particular service, and viewing products and services provided by the directorate. The newly designed site is: <http://co.msfc.nasa.gov/> or access it from "Inside Marshall."

## Washington, D.C., bans cell phones by motorists

A new Washington, D.C., law bans motorists from using hand-held cell phones while driving. If ticketed, drivers could be fined \$100 and levied one point against their license.

# Classified Ads

## Miscellaneous

- ★ Formal living room sofa, hummingbird design, \$300. 883-5543
- ★ Ring, 1 carat round solitaire, 14K yellow gold, \$1,700. 759-1494
- ★ Framed puzzles of space scenes, \$25 each. 885-2450
- ★ Olde English Bulldog, NKC registered male, 1-1/2 yrs. old, named "Dozer". 256-653-3613
- ★ Youth and Dixie Boy's baseball bats, several sizes and weights. 256-353-4455
- ★ Camera, Minolta T202/50mm, F1.7+135mm, F28 lens, Vivitar2000 auto flash, \$150. 883-9789
- ★ Ruger KM77VT MKII .223 w/Weaver V16, \$699; H&K USP 45 ACP, \$550. 828-8630
- ★ Child Craft baby bed, frame, mattress, and safety mattress, \$275. 256-828-2864
- ★ Two Meranti arched 4-panel doors, 5mm tempered glass, size 1-3/4"x36"x80", ready to stain, \$300. 325-2823
- ★ Antique bottle collection, buy only pieces you want, name your price. 256-828-4334
- ★ Pool table, 4x8, 1" slate, lifetime warranty, delivery/recovering, \$900; you pickup \$700. 652-9623
- ★ Antique Grape by Poppytrail, 6, 5 pc. place settings; bowls, platters, sug/cr, salt/pepper, \$50. 881-3937
- ★ Cement stepping stones, 11 round, fifteen 16" square, \$1 each, 8 rounded scalloped border. 837-6776
- ★ DeMarini Vexxum 29/15.5 Little League bat, brand new, still in plastic wrapping, \$100. 971-9710
- ★ 1993 Yamaha Waverunner III, galvanized trailer, cover. 931-580-1553
- ★ T-Mobile Motorola V300 camera phone, used 2 months, color screen, web enabled, \$200 firm. 468-5242
- ★ Little Tykes cottage, \$100; Black plastic toolbox for small truck, \$25. 256-355-6984
- ★ Pride Jet 3 Motorized wheelchair, 17" turning radius, 250# capacity, \$1,500. 256-559-0358
- ★ Browning A-bolt, 30-06, composite stalker w/BOSS, Leupold mounts, tasco world class

- pluss 3.5-10x50, \$550. 379-3606
- ★ Antique Hepplewhite-style dining room suite w/six chairs, Mahogany & Cherry, \$3,600. 882-2076
- ★ Murray 20" big wheel lawn mower w/ bagger, \$75. 883-5168
- ★ Leather recliner, \$200; desk, \$50; dresser, \$200; dog house, \$20; exercise bike, \$75. 256-534-0939
- ★ Murray riding mower, for parts or can be repaired, pick up, best offer. 837-9813
- ★ Cherry finish queen semi-waveless waterbed w/12 drawer storage underneath, \$150. 880-3737
- ★ Broynhill sofa, 90", gold chenille w/tapestry floral pillows, 2 yrs. old, \$250. 971-2773
- ★ HP-Deskjet 722C, \$20; HP-ScanJet 3300, \$20; ATI-Rage 8MB AGP, \$10; ATI-TV-Wonder PCI, \$20. 765-532-4218
- ★ Pennsylvania House sofa, \$300. 232-6626
- ★ Traditional sofa, \$150; hammock/stand, \$50; 30x60 desk, \$75; blue loveseat, \$75; china cabinet, \$200. 534-9631
- ★ Short blue sofa, \$55. 430-6842
- ★ IMAC, 700 MHZ, G4, 256K, 40GB, combo drive, 15" LCD, \$1,000. 837-4403
- ★ Sixteen 5-piece place settings, sandstone, white dishes, microwavable, from Service Merchandise, \$25. 256-881-3322
- ★ GM 350 4-bolt main carte engine, complete, purchased new 10/2001, 30K miles, w/clutch, \$1,200. 256-498-3194

## Vehicles

- ★ Gulfstream, 36', 24K miles, generator, jacks, VCR, camera, awning, bath, kitchen, bedroom, \$42,000. 256-931-0177
- ★ 1996 Kawasaki STS 750 jet ski, 3-person, \$2,350. 882-6095
- ★ 2001 Ford Mustang GT, black w/leather seats, 47K miles, 5-speed, loaded, \$16,500 firm. 828-7337
- ★ 1991 Toyota Camry DX, 4-door, 168K miles, \$2,800. 256-532-5913
- ★ 2002 Toyota 4-Runner, 34K miles, SR5, gold, rebuilt title, \$18,500. 256-757-2850
- ★ 2004 KTM 125 SX dirt bike, less than 8 hrs., \$4,100. 256-682-4141
- ★ 1998 Pontiac Grand Prix GTP, red, black leather, sunroof, HUD, CD, 71k miles, \$8,300. 721-3945

- ★ 1999 Chevy Tracker, 4-cyl., 4-dr., AC, auto, PB, silver w/gray interior, 61K miles, \$5,000. 325-1126
- ★ 1987 Chevrolet Caprice, V8, CD, cold air, \$700. 256-353-6635
- ★ 1992 Honda Civic DX, 208K miles, 5-speed manual sedan, \$1,300. 851-8738
- ★ 2001 Ford F-150 XLT, 4-dr., Super Crew, 4.6L/V8, white, bedliner, tow-pkg., 69.7K miles, \$15,000. 256-426-2224
- ★ 2000 Chrysler Town & Country LXi, one-owner, loaded, leather, garage kept, 67K miles, \$10,500. 468-3749
- ★ 1992 Honda Accord EX, rosewood, auto, original-owner, 245K miles, \$2,750. 931-703-5956
- ★ 2000/2001 Honda XR-250R dirt bikes, \$2,000 each. 256-550-1165
- ★ 1999 Chevy Tahoe, tan/tan leather, CD, new tires, 54K miles, tow pkg., \$12,300. 256-461-0903
- ★ 1993 Yamaha Waverunner III, galvanized trailer, cover. 931-580-1553
- ★ 1984 Cadillac Fleetwood, 4-door, maintained, garaged, approx. 100K, tires, a/c, \$2,500. 534-6166
- ★ 1988 Pontiac Bonneville, V6, 149K miles, burgundy, new tires, \$850. 837-4403
- ★ AlumaCraft boat, 9.9HP Evinrude, 28 lb. thrust motor guide, \$930. 772-9768

## Wanted

- ★ Atari 2600, six switch system, controllers, games, and power pack. 830-8934
- ★ 250 gallon propane tank to use making a BBQ Grill. 683-4207
- ★ Original model Nintendo system and games. 479-2620
- ★ Bar and chain, 14" or 16" for McCulloch Mac 3200 C156 chainsaw. 883-2757

## Free

- ★ Female mixed breed dog, 40lbs. 3 yrs., spayed, obedience schooled, no other dogs. 882-6255

## Lost

- ★ Silver bracelet made up of alternating boxes and balls, probably in Bldg. 4200 complex. 544-5884

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